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CONTENTS

Slifer—Variations in the Spermatheca of Two Species of Grasshoppers (Orthoptera, Acrididae 1
Obituary Note:—Dr. Royal N. Chapman. 3
Rau—The Life History of the Wood-Roach, Parcoblatta pennsylvanica DeGeer, (Orthoptera: Blattidae). 4
Tribute to the Late Dr. W. E. Britton 9
Brown—A New Species of Pseudogonatopus (Hymenoptera, Dryinidae) 10
Obituary Note:—Dr. Walther Horn 11
Cooke—Observations on Mating Flights of the May-fly Stenonema vicarium (Ephemerida) 12
Hess - A Simple Method for Photographing Insect Wings 15
Wing—Some Cheap Editions of Books on Entomology. 16
Worth—Protective Shape and Coloration of the Spider, Cyclosa bifurca 17
The Evanidae 18
Alexander—The Revista de Entomologia. 19
The Entomological Society of India 20
Current Entomological Literature 21
Review of Sandhouse's The North American Bees of the Genus Osmia. 28
Review of Osborn's Meadow and Pasture Insects. 28
A New Entomological Journal. 30

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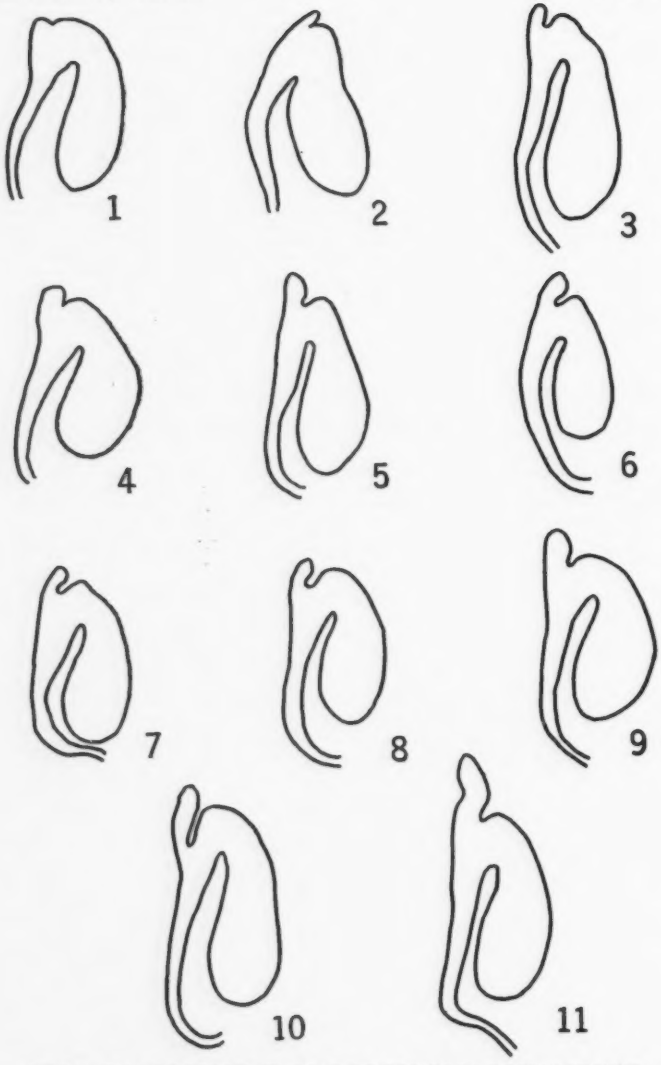
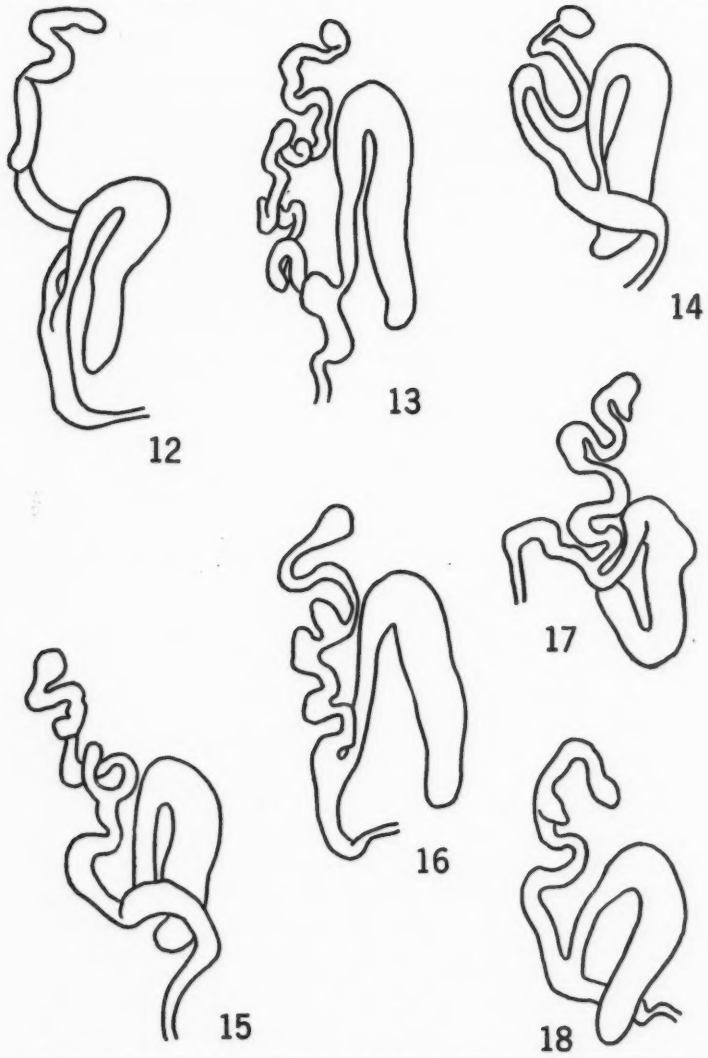


DISTAL TIPS OF SPERMATHECAE OF OEDIPODA COERULESCENS
SLIFER.



DISTAL TIPS OF SPERMATHECAE OF MELANOPLUS DIFFERENTIALIS.
Slifer.

ENTOMOLOGICAL NEWS

VOL. LI JANUARY, 1940 No. 1

Variations in the Spermatheca of Two Species of Grasshoppers (Orthoptera, Acrididae).

By ELEANOR H. SLIFER, Department of Zoology,
State University of Iowa.

(Plates I and II.)

During a series of studies on the internal genitalia of female grasshoppers belonging to nine subfamilies and from many parts of the world the question concerning the amount of variation which occurs within a species naturally arose. Most of the species studied could not be obtained in sufficient numbers to permit a satisfactory investigation of this problem. Recently, however, a series of *Oedipoda coerulescens* (Linn.) collected at different localities in Europe and in Asia were sent to the writer by Dr. B. P. Uvarov of the British Museum (Natural History). These have proven to be extremely interesting because they indicate the amount of variation which may be expected within a single species taken at widely separated geographical points. To supplement these results an examination was also made of a large number of individuals of another species, *Melanoplus differentialis* (Thom.), which were collected in a more restricted area. These were caught, for the most part, in Iowa, or were raised from eggs hatched in this laboratory. Since *Oedipoda coerulescens* is a member of the Oedipodinae and an Old World form, while *Melanoplus differentialis* belongs to the Cyrtacanthacridinae and inhabits the New World, the data given here should serve as a better basis for generalizations than would results secured from more closely related species or from those taken in the same region.

As has been pointed out in a previous article (Slifer 1939), the spermatheca in the Acrididae is of considerable interest, for it varies in form in the different species, yet the members of a single subfamily possess spermathecae which, in nearly all cases, are of the same general pattern. The distal end of

the spermatheca is of especial interest and is the part which has been selected here for purposes of comparison. The genitalia were prepared for study by boiling the posterior half of the abdomen in a solution of KOH and the parts shown, in consequence, represent only the chitinous linings. All muscles, epidermal tissues, etc., disintegrate in the alkali.

Outlines of the distal tips of the spermathecae from eleven specimens of *Oedipoda coerulescens* are shown on plate I. All, it will be noted, are provided with both a small apical diverticulum and a large, sac-like preapical diverticulum. The relative dimensions of the two diverticula are of some interest and measurements of the length of these parts show that the preapical diverticulum in figure 1 is approximately 10 times as long as the apical diverticulum, while the larger diverticulum of the specimen shown in figure 11 is only 2.7 times longer than the smaller one. The variations seem to show no correlation with the region in which the animal was captured.

For the second set of observations the spermathecae from 103 individuals of *Melanoplus differentialis* were examined and compared. In this species the spermatheca is also provided with two diverticula, but the entire structure is of a more complex type than that which occurs in *Oedipoda coerulescens*. The variations found in the diverticula of *Melanoplus differentialis* are of several kinds. The length of the apical diverticulum varies between such extremes as are shown in figures 13 and 18. It may contain few coils (fig. 14) or many (fig. 13). By far the greatest number of specimens are best described as intermediate between those shown in figures 12 and 13. In some the apical diverticulum is of nearly uniform diameter throughout its length, while in others certain regions are either enlarged (fig. 16) or narrowed (fig. 14). In seven out of 103 individuals which were studied small projections or "knobs", such as are shown in figures 15, 16 and 18, were found on the apical diverticulum. In a few cases the extreme tip of this diverticulum was unusual in shape (figs. 14 and 17). The preapical diverticula were somewhat less variable in form than were the apical diverticula. A specimen in which the free end of this diverticulum is bent back on itself is

shown in figure 17.

From the results obtained with these two species it seems reasonably safe to predict that the form of the spermatheca will also be found to vary in the individuals of other species of Acrididae, but that the variations will be minor ones and that the general pattern will be retained.

REFERENCE.

SLIFER, E. H. 1939. The internal genitalia of female Acridinae, Oedipodinae and Pauliniinae (Orthoptera, Acrididae). Jour. Morph. 65 (3): 437-469, 7 pls. of 111 figures.

EXPLANATION OF PLATES.

Plate I. Distal tips of spermathecae from *Oedipoda coerulescens* (Linn.) after treatment with KOH. Locality where specimen was taken indicated for each. x 22.5. Fig. 1. Rome, Italy; 2. Schwalbach, Germany; 3. Sierra de Guadarrama, Spain; 4. Arquata, Italy; Tchimbulak, Alexander Mts., Turkestan; 6. Port-Bou, Gerona, Cataluna, Spain; 7. Mytilene, Greece; 8. Turin, Italy; 9. Crikvenica, Yugo-Slavia; 10. Zakaki, Cyprus; 11. South Russia.

Plate II. Distal tips of spermathecae from *Melanoplus differentialis* (Thom.) after treatment with KOH. To demonstrate range of variation found in 103 individuals. x 22.5.

fig. 12. Apical diverticulum with few coils.
fig. 13. Apical diverticulum with many coils.
fig. 14. Apical diverticulum ends in globose swelling.
fig. 15. Apical diverticulum with slender "knob".
fig. 16. Apical diverticulum with lateral swellings.
fig. 17. Apical diverticulum with oddly-shaped tip. Preapical diverticulum recurved.
fig. 18. Apical diverticulum with pointed, lateral projection.

Obituary Note: Dr. Royal N. Chapman.

Dr. ROYAL NORTON CHAPMAN died December 2, 1939, according to *Science* for December 15. He was born at Morristown, Minnesota, September 17, 1889. He had returned to the University of Minnesota only recently, after nine years' service in Hawaii. His text-book on Ecology and the studies by himself and his students on populations of insects in stored food products are well known to entomologists.

The Life History of the Wood-Roach, Parcoblatta pennsylvanica DeGeer, (Orthoptera: Blattidae).

By PHIL RAU, Kirkwood, Missouri.

The wood-roach, *Parcoblatta pennsylvanica*,[1] is well distributed throughout St. Louis County. It is usually found in hollow trees, under loose bark, and often in wood piles and in crevices in rural buildings. The wood-roach is a trim, pretty creature, with its chestnut brown color, and thorax and wing pads edged in white. It does not possess the repulsive odor that is so characteristic of roaches of other species that infest the dwellings of man. In the adult form the males are fully winged, while the females have only the conspicuous wing-pads which are functionless. The males fly swiftly, but have not the ability to sustain themselves in the air for long periods.

There are about a dozen species of *Parcoblatta* in North America, and *P. pensylvanica* is reported from Maine, Massachusetts, Connecticut, Vermont and Indiana (Morse, Orthoptera of New England, p. 305, 1920). Here in St. Louis and St. Louis County, this species was taken in about a dozen localities, which indicates its permanent establishment in Missouri. It was first seen about the premises in Kirkwood in 1925, where a large population lived in a pile of cord-wood, in the crevices of the barn and in a near-by hollow tree. In later years, with the removal of both wood-pile and tree, they established themselves in the barn, chicken-house and a discarded bee-hive.

These roaches are not active during the day, but neither are they wholly lethargic, as may readily be discovered when an attempt is made to capture them. Their greatest activity, however, is during the night, and it is then that both sexes enter the traps that are set for them, and the males fly into lighted dwellings.[2]

[1] Specimens were identified by Mr. Morgan Hebard of the Academy of Natural Sciences of Philadelphia.

[2] Park and Keller (Ecology 13: 335-346, 1932) in experimental tests on the wood-roach find them to be active at night and inactive during the day.

The length of life of the roaches from the hatching of the eggs to the death of the adults is about one year. For several years I noticed that the nymphs in confinement, as well as those occupying the bee-hive outdoors, would become mature at the end of May. These adults would mate and oviposit, and the following May their offspring were matured and ready to do the same, thus completing the life cycle within a year.

COURTSHIP.

Both sexes, as already stated, become adult at the end of May, and very soon after becoming mature the males go in search of females. On any pleasant evening in early June, the males may be observed in action. At about 7:30 p. m., which is about dusk in early June, they come out of hiding and may be seen flying swiftly in the air or running with lightning rapidity over wall or woodpile. Soon the search goes on in the crevices between the logs. He lands on the log-pile, and without a pause runs rapidly and excitedly in a very erratic manner, his antennae quivering nervously as he examines crevice after crevice. If his quest has been successful, he disappears among the logs to remain there; if unsuccessful, he soon emerges and continues the search in the same agitated manner.

About 20 to 25 males were observed performing in this fashion on several successive nights in my yard in 1925; the courtship manoeuvers began on May 30, and by June 7, the activities were generally lessened, with only a few males in flight at dusk. They always came out into the open at about 7:30 p. m., and continued their performance until a little after 8:15 p. m. At that time it was usually too dark for me to see them, but apparently it was not too dark for the males to continue the search for some minutes after dark, for with a flash-light I could see the performance still going on, but by 8:35 the show was all over and all the males were under cover. During all the observations no females were to be seen in the open, but by lifting some of the logs several of them were uncovered. Some of the males evidently spend the daylight hours in the crevices near the females, but it seems

they need the stimulus of twilight to bring out their activities. One would think that this proximity would make the flight unnecessary, and that the males could easily find their mates without leaving the logs and going through the spectacular flight.

Copulation usually occurred under cover of the logs where it could not be witnessed, but I did see one pair mating on the barn wall. They were joined end to end with their heads in opposite directions and, contrary to the general belief that in roaches copulation is instantaneous, this pair remained mated for at least two hours.

Oviposition.

As in *Blatta orientalis* and *Periplaneta americana*, the wood-roach carries the egg-case protruding from her body for several days before she drops it. In this species the time varies from one to three days, the length of time probably being influenced by moisture or temperature conditions. The mother does not conceal the egg-case, as do the other roaches, who often carry them until they find a crack in which to conceal them or debris with which to cover them. The egg-capsule when it

Table I.

Egg-Cases Deposited by Parcoblatta pennsylvanica

♀ No.	Dates of Oviposition	No. Deposited	Date Died or Escaped	No. of Days Between Egg-Cases
A	June 23, 26—July 7, 12, 21, 26—Aug. 8, 16	8	Died 8/22	3, 11, 5, 9, 5, 8, 8
B	June 24, 26—July 7, 12, 21, 26—Aug. 3, 11	8	Died 8/22	2, 11, 5, 9, 5, 8, 8
C	June 26—July 9, 20, 31 —Aug. 10	5	Esc.	13, 11, 11, 10
D	June 27, July 7, 12, 19	4	Esc. 7/27	9, 5, 7
E	June 27—July 4, 7, 11, 16, 19, 26	7	Esc. 8/6	7, 3, 4, 5, 3, 7
F	June 28—July 7, 9, 15	4	Esc. 7/22	9, 2, 6
G	July 1, 5, 23	3	Esc. 8/3	4, 17
H	July 11, 15, 28—Aug. 3	4	Died 8/6	4, 13, 6
I	July 7, 17, 28, 31 — Aug. 6, 12, 17, 22	8	Died 8/25	10, 11, 3, 6, 6, 5, 5
J	July 11, 17, 25—Aug. 10, 15, 22, 28—Sept. 3, 7, 19, 24	11	Died 11/8	6, 8, 16, 5, 7, 6, 6 5, 12, 5

first protrudes from her body is of a creamy white color, but it soon becomes dark brown. Each egg case shows by lines of demarkation on the outside the position of the egg and compartments on the inside; each compartment contains one egg, so the ova are easily counted.

Number of Egg Capsules Deposited.

Records were kept of the number of egg capsules deposited by ten females, (Table I) five of which lived the normal length of life in confinement. These five females (A, B, H, I and J in table) deposited from 4 to 11 egg cases. The other five (C, D, E, F and G), before they escaped, deposited from 3 to 7 cases.

In the last column of Table I, I have recorded the number of days that elapsed between the production of egg-cases in 52 instances.

Table II. Interval between deposition of egg-cases.

No. of Days	Frequency	No. of Days	Frequency
2	2	10	2
3	4	11	5
4	3	12	1
5	11	13	2
6	7	14	0
7	4	15	0
8	5	16	1
9	4	17	1
		Total	52

The period which elapsed between layings varied from two to seventeen days. These records were, of course, made under conditions of confinement. Table II shows, however, that about half the egg-cases were produced after an interval of rest of from 5 to 9 days.

Period of Incubation.

These wood-roaches deposited egg-cases from June 23 to September 24, 1937. Twenty-six of these cases were placed separately in vials as soon as deposited, for the purpose of observing the period of incubation. (Table III). These were kept at ordinary room temperature.

Table III.

Period of Incubation, Days	Frequency
30	3
32	3
34	4
36	8
37	2
38	2
40	2
41	2

Thus the 26 egg-cases required from 30 to 41 days to give forth their young, the majority hatching in 32 to 36 days.

NUMBER OF EGGS IN EACH CASE.

The size of the egg-case of the wood-roach varies considerably, and since the eggs are tightly packed in the case there is a definite relation between the size of the capsule and the number of eggs in it. Twenty-nine cases were placed in separate vials for the purpose of counting the emerging nymphs, with the following results. (Table IV):

Table IV.

Number of Young to Emerge	Frequency
18	2
19	1
20	4
22	2
24	5
25	3
26	5
28	1
30	6

Thus two-thirds of this lot of cases gave forth from 24 to 30 young, while the remainder yielded fewer, from 18 to 22.

When the eggs have hatched and the young emerge, the capsule springs open along the serrated edge, and immediately closes again after the nymphs have emerged. With the thumb and forefinger one can easily cause an empty egg-case to bulge open, but one cannot do so with a full one; this indicates that the edges of the opening are originally cemented together,

and that it opens along this line with the expansion of the larvae within it.

The Number of Eggs Deposited, Versus the Number thah Hatch.

When our wood-roaches had no opportunity to mate, egg-cases were deposited nevertheless. These in all instances proved to be infertile. In several instances female wood-roaches were confined with male oriental roaches, in the hope of getting hybrid young. It is not known whether mating occurred, but the eggs deposited by the wood-roaches under these conditions were always infertile.

In studying the empty egg-purses, we almost always find that all of the young have made a perfect escape. While the entire contents of an egg-capsule is usually disclosed at one time, one often finds a case giving forth one or two stragglers a day later. Only in rare instances do we find dead individuals in the capsule after the eggs have hatched, and in these instances not more than one or two dead ones are found. In normal egg-cases there is a small vestibule or air-chamber at each end. In some capsules, an extra egg has been crowded into this vestibule, and when this occurs, if there should be any mortality in the case at all, it is usually this one in the crowded position. But I have also observed on occasion the complete development of eggs in such places.

The roaches on hatching are white and almost transparent; only the eyes are pigmented, and there is a dark spot at the tip of the abdomen. After about six hours, they become light brown, and after another twelve hours they assume the normal color of very dark brown.

(To be continued.)

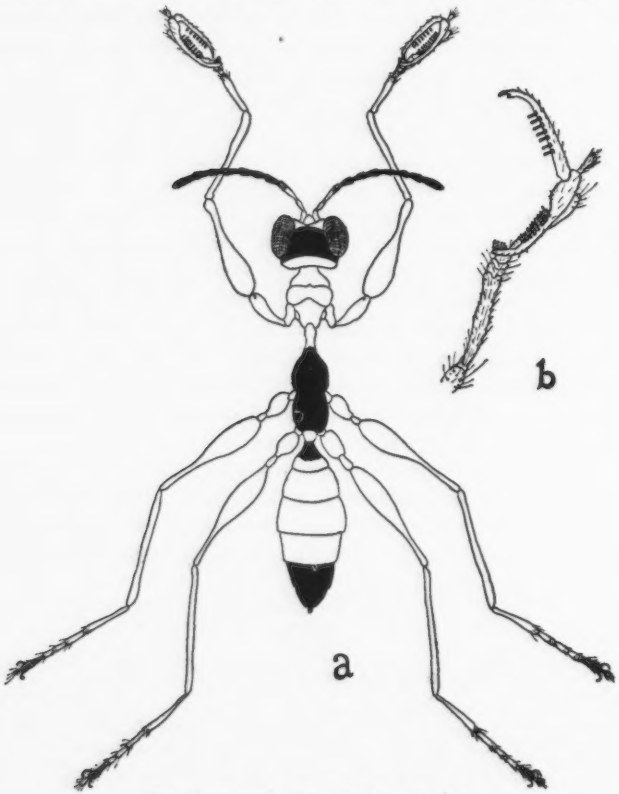
Tribute to the Late Dr. W. E. Britton.

Tribute to the late Dr. W. E. Britton, Connecticut state entomologist from 1901 until the time of his death, February, 1939, was part of the program of the sixteenth annual conference of Connecticut entomologists that met on October 27, 1939, at the Universiy of Connecticut at Storrs. The principal address was given by Dr. E. P. Felt.

A New Species of Pseudogonatopus (Hymenoptera, Dryinidae).

By HARRY E. BROWN, University of Missouri.

The single specimen described below as a new species of the genus *Pseudogonatopus* was collected July 30, 1932, in a swampy meadow in northern Indiana. The author wishes to extend sincere thanks to Dr. Frank A. Fenton of the Okla-



Pseudognatopus magnus new species.
a dorsal view of female, *b* details of chela.

homa Agricultural and Mechanical College for graciously furnishing information on the Dryinids and for making comparisons with specimens in his private collection.

Pseudogonatopus magnus n. sp.

♀. Honey yellow in color with black bands on head, thorax and abdomen.

Head transverse, truncate behind, strongly concave between eyes. Ocelli arranged in triangle, approximate and prominent. Eyes bare. Mandibles three-dentate, maxillary palpus four-segmented. Basal two segments and proximal half of segment three of antennae yellow, remainder dark fuscous. General color of head yellow with a broad fuscous band across concave dorsal portion between the eyes.

Prothorax yellow with fine shagreened punctation. Propodeum black, transversely rugulose anteriorly and posteriorly.

Fore legs completely yellow. Median chela arm with two rows of lamellae which converge toward distal end; tip spoon-shaped with cluster of lamellae. Lateral arm of chela with a pronounced notch or tooth at distal end and with a row of seven lamellae medianly. Middle and hind legs yellow except last segment of tarsus which is brown.

Abdomen smooth, polished; base of petiole and last two segments black, segments between yellow.

Length: 5 mm.

♂. Unknown.

Type Locality: Wawasee Lake, INDIANA.

Holotype, collected July 30, 1932. Specimen in the collection of Dr. Frank A. Fenton.

Remarks: The host is unknown, but because of the large size of the parasite it must be one of the larger fulgorids.

Obituary Note: Dr. Walther Horn.

Dr. WALTHER HORN, authority on the Cicindelidae, bibliographer and museologist in entomology, creator of the Deutsches Entomologisches Museum in Berlin-Dahlem, died in that city July 10, 1939. He was born October 19, 1879. An obituary notice by Dr. A. Avinoff, with portrait, is in the *Annals of the Entomological Society of America* for December, 1939; a much longer one by H. Sachtleben, with portrait and bibliography, is in *Arbeiten über morphologischen u. taxonomischen Entomologie* 6: 201-222. He was elected a corresponding member of The American Entomological Society in Philadelphia on June 12, 1911.

Observations on Mating Flights of the May-fly Stenonema vicarium (Ephemerida).

By Herman G. Cooke, University of Pennsylvania, Philadelphia.

A small company of *Stenonema vicarium* imagoes was first observed mating after sundown on July 15, 1938. They appeared over the foot of a bridge about eight paces from the bank of Darby Creek, one mile north of Clifton Heights, Pennsylvania.

The males of *Stenonema* exhibited a characteristic flight which differed widely from that of most known genera of mayflies, but in their approach during mating they showed striking similarity to other genera. Of greater importance was the fact that these imagoes neither rose nor fell in rhythmic undulations, as in the case of *Baetis* described by Murphy 1922, but for the most part maintained a constant level during flight. These performances were observed at the same locality from four to six times weekly. They usually began after sunset and about twenty minutes before nightfall and continued until I could no longer see them, owing to the increasing darkness. Searches made every hour in the day between 7 o'clock a. m. and midnight revealed no mating flights except at the hours mentioned above.

The first indication of flight was the appearance of a single male slowly descending with out-stretched wings from the gray distance, to about the level of the eye of an observer, at which point a hovering movement began. Within from two to three minutes about three additional males were suddenly seen executing the same performance. This small group of individuals formed the nucleus about which additional males revolved. After the flight had been in progress for about ten minutes, the number usually reached about fifteen. The complete company seldom exceeded more than twenty-five members. As they slowly manoeuvered to and fro along a course about ten paces long by six wide and executed quick turns, their forward projecting forelegs, shining wings and outspread tails gave color and grace to their performance.

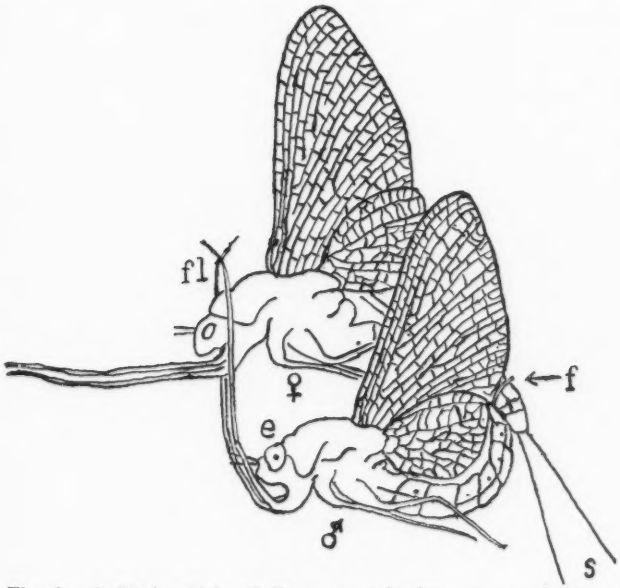


Fig. 1. A Mating Pair of *Stenonema vicarium*. *e* eye, *f* forceps, *fl* forelegs, *s* setae.

Females showed very little tendency to take part in the flights. The captures of two complete companies of imagoes and of the greater portion of a third yielded only one female, which was taken with the second group. It is probable that this female had just entered the swarm from beneath, because when a single female was seen passing below a company of males it was seldom disturbed; on the other hand, when it passed a few feet above or directly through the swarm, it was instantly attacked by them. The large eyes of the males are situated on the dorso-lateral regions of the head (fig. 1 e), a location which perhaps enables this sex to see females above them better than below. All attempts to mate were made by the male flying up beneath the female placing his forelegs over her prothorax and head. With upcurved abdomen he grasped the body of the female with his forceps near her

seventh abdominal segment (fig. 1 f) and mating thus became effective. The couple executed a double flight, seldom rising over eight feet while at times they were borne nearly to the ground, but before reaching it they usually broke apart. For the most part, copulation lasts from about twenty to forty seconds. On several occasions, after having mated, or attempted to mate, the male was seen returning to the swarm while the female continued onward to the stream and flew up it maintaining nearly the same level until ready to oviposit.

Oviposition takes place as follows: The female selects a ripple on the surface of the water and slowly descends. After dipping the abdomen in the water, at least twice, a resting position is assumed upon the surface, with head turned upstream, she flutters for a few seconds and discharges the eggs which are already partly protruded from her oviducts. The current aids in releasing the eggs, which slowly separate in the water and adhere to objects by means of the viscid strands. Two females which were watched while releasing their eggs, then turned and flew down stream.

A couple of imagoes captured while mating remained united for several seconds. Shortly after the abdomen of the female had been released she discharged two spherical masses of flame-colored eggs from her oviducts, which adhered firmly to the bottom of the nest.

These flights were observed, as stated above, from four to six times weekly from July 15, 1938 to October 13, 1938. The last of these flights (October 13) took place amid a downpour of rain, after which the weather grew cooler and no such flights were seen at this location although daily observations continued until November 28, 1938.

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NEEDHAM, JAMES G., TRAVER, JAY R. and HSU, YIN-CHI 1935. The Biology of Mayflies.

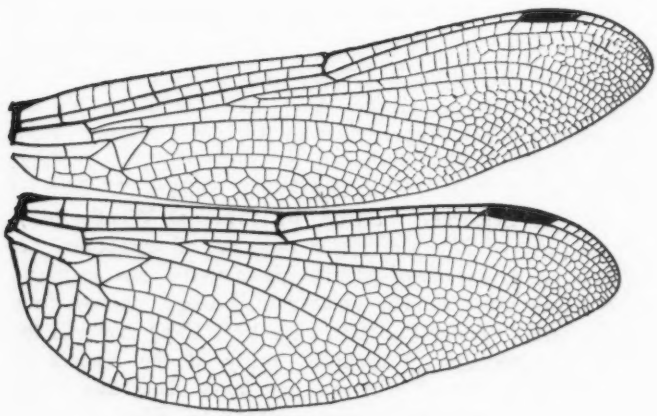
A Simple Method for Photographing Insect Wings.

By A. D. Hess, Instructor in Limnology, Laboratory of Limnology and Fisheries, Cornell University, Ithaca, New York.

The following-described method of photographing insect wings has been used by the writer for a number of years Because of its simplicity, it may be useful to other entomologists who wish to obtain pictures of insect wings with a minimum of cost and effort.

The wings are mounted dry between two lantern slide cover glasses. The mount is then placed in an enlarging machine in which the regular bulb has been replaced by a 10 or 15 watt bulb. The image is focused upon the easel in the same way as with a negative. The exposure is made upon Process film, using test strips to determine the proper exposure period the same as is done in ordinary enlarging. The film is developed in the Eastman D 11 formula. From the resulting "negative" as many positive prints as are desired may be made by regular printing methods.

The prints obtained are sharp and clear, are much more



Gomphus confraternus Selys.

accurate than drawings, and may be made in a fraction of the time which would be required to make a drawing.

The method is especially suitable for the many-veined hyaline-winged insects, such as the Odonata. The writer has used the method to make wing-prints of Odonata, Orthoptera, Diptera, and Plecoptera.

In order to get a picture of the entire venation in wings having patches of color on them (such as various species of *Celithemis*), Panchromatic Process film and a combination of color filters can be used to "filter out" the color patches.

Where it is desirable to obtain a picture of the venation of a valuable specimen from which the wings cannot be removed, it has been found possible to pin it on a block with the wings projecting over the edge and place the entire insect in the enlarger. A special frame has been made in which dragonflies can be placed with their wings held flat between plates of glass.

Negatives have also been made from lantern slide plates and enlarging paper, but the Process film proved the most satisfactory.

Some Cheap Editions of Books on Entomology.

I have noted recently that three volumes of unusual interest are in the "Everyman's Library" of E. P. Dutton & Co. These are: Bates, Henry W., "The Naturalist on the Amazons." Illus. Appreciation by Charles Darwin. (446), Belt, Thomas, "The Naturalist in Nicaragua," Map. Illus. Introd. by A. Belt. (561), and White, Gilbert, "A Natural History of Selborne." Introd. by Principal Windle (48). At the price of $.90 per volume these are all exceptional reprint buys, as the out-of-print originals would cost so much. Eric Nordenskiold's "The History of Biology" is now in a reprint series (Tudor Pub. Co., New York City) and sells for $1.48 plus postage. Presumably many of the readers of "Entomological News" who may not know about this would like a personal copy at this price.—MERLE W. WING.

Protective Shape and Coloration of the Spider, Cyclosa bifurca (Arachnida: Argiopidae).

By C. Brooke Worth, The Rockefeller Institute for Medical Research, Department of Animal and Plant Pathology, Princeton, New Jersey.

In early April, 1939, I observed many webs of *Cyclosa bifurca* against the walls of a house at Palm Beach, Florida.

Comstock (1) has already commented on the "self-protective habits" of a related spider, *Cyclosa caroli,* as follows:

"The orb of the adult is about six inches in diameter. The female fastens her egg-sacs in a series which extends across the orb from the hub to the upper margin like a stabilimentum, and looks like a dead twig caught in the web. This band of egg-sacs and the spider are of the same gray colour. When disturbed the spider rushes to the band and appears as if it were a part of it. And here it will cling motionless even when the band is removed from the web."

In less detail he gives a closely similar account for *Cyclosa bifurca.* But owing to the striking lesson in protective mimicry which these spiders afford, I wish to enlarge on Comstock's accurate and illuminating description.

The webs of *Cyclosa bifurca* are also about six inches in diameter. They are disposed in a vertical position, in this case closely parallel to the walls of the house. The egg-sacs are arranged in a row, occupying the position of the hands of a clock at exactly noon. The spider herself reposes at the center of the web, that is, immediately below and touching the lowermost egg-sac. She invariably faces the ground, so that her abdomen appears as an additional egg-sac in the row above her.

In my notes I state that the appearance of this mass of objects in the web is that of a catkin which has become entangled in the sticky meshes. This appearance is heightened by the spider's disposition of captured food. Such prey is wrapped in silk and anchored below the spider, forming an uneven row of objects as a direct short continuation of the line of egg-sacs.

The average length of the "catkins", i. e., egg-sacs, spider,

and food-sacs from above downwards, is from two-and-a-half to three inches, which means that they occupy about half the diameter of the web. The usual number of egg-sacs ranges from five to nine, with eight as an average.

But the most remarkable feature of all is the resemblance of the egg-sacs to the abdomen of the female. The latter is light green with dark green central and lateral stripes, and in these details the egg-sacs agree precisely with their maternal source. The spider's abdomen moreover bears a series of tubercles and projections, which again are reproduced faithfully in the egg-sacs, even including the terminal bifurcation. The egg-sacs, finally, are deposited in the web in a shingled or over-lapping series, and the spider takes a position at the center of the web so that her abdomen overlaps the lowermost egg-sac in an exact continuation of the series above her.

The spider's abdomen, seen in profile, has a generally flattened S-shaped curve; so have the egg-sacs: and it is this shape which permits the easy overlapping of the entire series.

The spider's light green color and smooth integument give it a translucent appearance when seen close at hand. Even this quality of translucence is duplicated in the smooth-woven texture of the egg-sacs.

Thus the agreement in appearance of the spider's abdomen and her egg-sacs includes the following visual considerations: station and disposition in the web, total configuration, ground color, color pattern, and apparent texture. The spider, in short, would appear to be no more than an egg-sac herself, were it not for that significant appendage, the cephalothorax.

(1) Comstock, John Henry, 1920. The Spider Book, Doubleday, Page and Company, New York. Pp. 453 and 454.

The Evanidae (Hymenoptera).

From Part 24 of the *Catalogue of Indian Insects,* by M. S. Mani, issued under the authority of the Government of India, Delhi, 1939, recently received, we learn that 50 species, both recent and fossil, so far are described from India, over 300 species from the whole world. *Evania appendigaster* L. is cosmopolitan.

The Revista de Entomologia.

On April 25, 1931, there appeared the first fascicle of a new publication devoted primarily to the entomology of the vast Neotropical faunal area. The list of contributors to this initial volume, including the late John Merton Aldrich, Walther Horn and William Morton Wheeler, together with many others still living, indicated clearly the high standard that was proposed. This high calibre of authorship has been maintained consistently throughout the entire series of ten large volumes that have appeared to the present date. Its influence on the entomology of the Neotropics has been profound and cannot well be overestimated.

The founder and editor of the "Revista," P. Thomaz Borgmeier, recently has issued an appeal to certain of his subscribers in the United States calling to their attention the fact that, due to the disturbed conditions in Europe, many subscriptions to the magazine have been allowed to lapse and that if publication is to continue more subscribers must be obtained from countries not directly involved in the War. It is the purpose of this note to call the above fact to the attention of interested parties and friends of the "Revista" and thus do what is possible toward preventing the action suggested. It would be a catastrophe of highest order to have this splendid magazine cease publication or even be forced to curtail its activities to any degree. While being devoted primarily to entomology of South and Middle America, articles dealing with the North American fauna will be acceptable for publication.

The "Revista" considers all branches of entomology with thoroughness, including the Applied, Biological, Ecological, Morphological and Systematic aspects. Of particular interest and value to all scientists who are working on the Neotropical fauna is the section on "Bibliographia" wherein is presented a record of all papers that relate directly or indirectly to the entomology of the Neotropics. This section alone is well worth the price of the entire volume. It seems certain that the present disturbance in the Old World is merely a passing phase and that when peace is again restored South America and its virtually unlimited natural resources, including its wealth of insects and insect problems, will forge rapidly ahead in public attention and interest. It is because of this permanence of the future that the present doubt concerning the financial condition of the "Revista" should be speedily removed.

The "Revista" is published in three large fascicles per annum, recent volumes having included from approximately 450 to 600 pages, with numerous plates and text figures. The leading

articles are published in English, French, German, Portuguese or Spanish, according to the nationality of the contributor. The magazine has received the highest possible commendation from many scientists, including several American entomologists. New subscriptions should be sent to the Editor, P. Thomaz Borgmeier, Convento S. Antonio, Largo da Carioca, Rio de Janeiro, Brazil. The subscription is four dollars, United States currency, per volume. The ten volumes that have appeared to this date may be obtained at the above stated annual subscription price by applying directly to P. Borgmeier.

C. P. ALEXANDER, Mass. State College,
Amherst, Massachusetts.

The Entomological Society of India.

This Society, founded at Calcutta, January 7, 1938, during the Silver Jubilee Session of the Indian Science Congress, has issued, under one cover, Vol. I, Parts 1 and 2 of *The Indian Journal of Entomology,* June, 1939, New Delhi. The cover states: "The Society exists for the encouragement and promotion of entomological study and research in India. Membership of the Society is open to all persons, over 18, interested in Entomology. Owing to the difficulty of members from all over India meeting frequently at any one place the Society has established branches at important scientific centres in different parts of the country, where its meetings are held. *The Indian Journal of Entomology,* which is to be the official organ of the Society will for the present be published twice a year in June and December, and will be supplied free to members. For non-members, institutions, etc., the subscription is fixed at Rs. 16 abroad." The Journal is not open for exchange. In a list of 42 Foundation Members, with one European exception, the names are Indian. The Executive Council for 1939 included M. Afzal Husain, *President,* Hem Singh Pruthi and T. V. Ramakrishna Ayyar, *Vice Presidents.* Dr. Pruthi is Chief Editor of the *Journal* and the other members of the editorial board are Drs. Ayyar, Khan A. Rahman, N. C. Chatterjee, Dev Raj Mehta and K. Lal, Managing Editor. In the opening article, "Ourselves," is the passage: "The number of amateur entomologists in India is very insignificant and even that of professional entomologists is far from being adequate. The task of exploration of the insect communities of different ecological areas . . . cannot adequately be tackled unless there is a body of workers interested in insect life for its own sake and is pursuing studies unhampered by any considerations of their immediate utility."

We wish the Society and its Journal all success!

List of Titles of Publications Referred to by Numbers in Entomological Literature in Entomological News.

1. Transactions of The American Entomological Society. Philadelphia.
2. Entomologische Blätter, red. v. H. Eckstein etc. Berlin.
3. Annales Sci. Naturelles, Zoologie, Paris.
4. Canadian Entomologist. London, Canada.
5. Psyche, A Journal of Entomology. Boston, Mass.
6. Journal of the New York Entomological Society. New York.
7. Annals of the Entomological Society of America. Columbus, Ohio.
8. Entomologists' Monthly Magazine. London.
9. The Entomologist. London.
10. Proceedings of the Ent. Soc. of Washington. Washington, D. C.
11. Deutsche entomologische Zeitschrift. Berlin.
12. Journal of Economic Entomology, Geneva, N. Y.
13. Journal of Entomology and Zoology. Claremont, Cal.
14. Archivos do Instituto Biologico, Sao Paulo.
15. Annales Academia Brasileira de Sciencias. Rio de Janeiro.
17. Entomologische Rundschau. Stuttgart, Germany.
18. Entomologische Zeitschrift. Frankfurt-M.
19. Bulletin of the Brooklyn Entomological Society. Brooklyn, N. Y.
20. Societas entomologica. Stuttgart, Germany.
21. The Entomologists' Record and Journal of Variation. London.
22. Bulletin of Entomological Research. London.
23. Bollettino del Lab. di Zool. gen. e agraria della Portici. Italy.
24. Annales de la société entomologique de France. Paris.
25. Bulletin de la société entomologique de France. Paris.
27. Bolletino della Societa Entomologica Italiana. Genova.
28. Ent. Tidskrift utgifen af Ent. Föreningen i Stockholm. Sweden.
29. Annual Report of the Ent. Society of Ontario. Toronto, Canada.
30. Archivos do Instituto de Biologia Vegetal, R. d. Janeiro.
31. Nature. London.
32. Boletim do Museu Nacional do Rio de Janiero. Brazil.
33. Bull. et Annales de la Société entomologique de Belgique. Bruxelles.
34. Zoologischer Anzeiger, hrsg. v. E. Korschelt. Leipzig.
35. The Annals of Applied Biology. Cambridge, England.
36. Trans. Royal Entomological Society, London. England.
37. Proceedings of the Hawaiian Entomological Society. Honolulu.
38. Bull. of the Southern California Academy of Sciences. Los Angeles.
39. The Florida Entomologist. Gainesville, Fla.
40. American Museum Novitates. New York.
41. Mitteilungen der schweiz. ent. Gesellschaft. Schaffhausen, Switzerland.
42. The Journal of Experimental Zoology. Philadelphia.
43. Ohio Journal of Sciences. Columbus, Ohio.
44. Revista chileña de historia natural. Valparaiso, Chile.
45. Zeitschrift für wissenschaftliche Insektenbiologie. Berlin.
46. Zeitschrift für Morphologie und Ökologie der Tiere. Berlin.
47. Journal of Agricultural Research. Washington, D. C.
49. Entomologische Mitteilungen. Berlin.
50. Proceedings of the U. S. National Museum. Washington, D. C.
51. Notulae entomologicae, ed. Soc. ent. Helsingfors. Helsingfors, Finland.
52. Archiv für Naturgeschichte, hrsg. v. E. Strand. Berlin.
53. Quarterly Journal of Microscopical Science. London.
54. Annales de Parasitologie Humaine et Compareé. Paris.
55. Pan-Pacific Entomologist. San Francisco, Cal.

56. "Konowia". Zeit. für systematische Insektenkunde. Wien, Austria.
57. La Feuille des Naturalistes. Paris.
58. Entomologische Berichten. Nederlandsche ent. Ver. Amsterdam.
59. Encyclopédie entomologique, ed. P. Lechevalier. Paris.
60. Stettiner entomologische Zeitung. Stettin, Germany.
61. Proceedings of the California Academy of Sciences. San Francisco.
62. Bulletin of the American Museum of Natural History. New York.
63. Deutsche entomologische Zeitschrift "Iris". Dresden.
64. Zeitschrift des österr. entomologen-Vereines. Wien.
65. Zeitschrift für angewandte Entomologie, hrsg. K. Escherich. Berlin.
66. Report of the Proceedings of the Entomological Meeting. Pusa, India.
67. University of California Publications, Entomology. Berkeley, Cal.
68. Science. New York.
69. Physis. Revista Soc. Argentina Cien. Nat. Buenos Aires.
70. Entomologica Americana, Brooklyn Entomological Society. Brooklyn.
71. Novitates Zoologicae. Tring, England.
72. Revue russe d'Entomologie. Leningrad, USSR.
73. Mem. Instituto Butantan. Sao Paulo, Brazil.
74. Sbornik entomolog. národniho musea v Praze. Prague, Czechoslovakia.
75. Annals and Magazine of Natural History. London.
77. Comptes rendus heb. des séances et mémo. de la soc. de biologie. Paris.
78. Bulletin Biologique de la France et de la Belgique. Paris.
79. Koleopterologische Rundschau. Wien.
80. Lepidopterologische Rundschau, hrsg. Adolf Hoffmann. Wien.
82. Bulletin, Division of the Natural History Survey. Urbana, Illinois.
83. Arkiv för zoologie, K. Svenska Vetenskapsakademien i. Stockholm.
84. Ecology. Brooklyn.
85. Genetics. Princeton, New Jersey.
87. Archiv für Entwicklungs mechanik der Organ., hrsg. v. Roux. Leipzig.
88. Die Naturwissenschaften, hrsg. A. Berliner. Berlin.
89. Zoologische Jahrbücher, hrsg. v. Spengel. Jena, Germany.
90. The American Naturalist. Garrison-on-Hudson, New York.
91. Journal of the Washington Academy of Sciences. Washington, D. C.
92. Biological Bulletin. Wood's Hole, Massachusetts.
93. Proceedings of the Zoological Society of London. England.
94. Zeitschrift für wissenschaftliche Zoologie. Leipzig.
95. Proceedings of the Biological Soc. of Washington, Washington, D. C.
97. Biologisches Zentralblatt. Leipzig.
98. Le Naturaliste Canadien. Cap Rouge, Chicoutimi, Quebec.
99. Mélanges exotico-entomologiques, Par Maurice Pic. Moulins, France.
100. Bulletin Intern., Acad. Polonaise Sci. et Lett. Cracovie.
101. Tijdschrift voor entomologie. Nederland. Ent. Ver., Amsterdam.
102. Entomologiske Meddelelser, Entomologisk Forening, Copenhagen.
103. Journal of the Kansas Entomological Society, Lawrence, Kansas.
104. Revista de la Sociedad entomologica Argentina, Buenos Aires.
105. Revista de Entomologia, Rio de Janeiro, Brazil.
106. Anales Sociedad Cientifica Argentina, Buenos Aires.
107. Proc., Royal Entomological Society, London.
108. Revista, Col. Nac. Vicente Rocafuerte, Guayaquil.
109. Arbeiten uber morpholog. und taxonom. ent. aus Berlin-Dahlem.
110. Arbeiten ueber physiolog. u. angewandte ent. aus Berlin-Dahlem.
111. Memorias do Instituto Oswaldo Cruz. Rio de Janeiro.
112. Anales del Instituto de Biologia Mexico.
113. Entomologische Beihefte aus Berlin Dahlem.
114. Occasional Papers of the Museum of Zoology, University of Michigan.
115. Memorias de la Soc. Cubana de Hist. Nat. Havana, Cuba.
116. Parasitology. Ed. Keilin and Hindle. London.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (•); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( )follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—Allen, G. M.—The parasites of bats [Bats] 1939: 293-317, ill. **Anon.**—Dehydration in Microscopy. [Museums Jour. London] 39: 376. Air bubbles in whole mounts. [Ward's Ent. & Nat. Sci. Bull.] 13:2. Shipping safely to foreign parts. [Ward's Ent. & Nat. Sci. Bull.] 13:2. An excellent new observation block. [Ward's Ent. & Nat. Sci. Bull.] 13:4. **Back, E. A.**—A new pest of books: Neogastrallus librinocens (Coleo.: Anobiidae). [12] 32: 642-645, ill. **Bradley, J. C.**—The philosophy of biological nomenclature. [Verh. VII Internat. Kongr. Ent.] 1: 531-534. **Chopard, L.**—Notice sur les travaux scientifiques. Mimeogr. 24pp. **Cockerell, T. D. A.**—The floating population of the air. [Science] 90: 353-354. **Detwiler, J. D.**—The history of the Entomological Society of Ontario as interpreted by a Londoner. [4] 71: 205-208. **Eichler, W.**——Eine bibliographische symbolik. Zur wissenschaftlichen arbeitstechnik. [Zool. Anzeiger] 126: 268-270. **Fulmek, L.**—Ein Insekten-Parasiten-Wirte-Index der Welt in Werden. [Verh. VII Internat. Kongr. Ent.] 1: 540-547. **Girault, A. A.**—On the two divisions of scientific work. [Verh. VII Internat. Kongr. Ent.] 1: 144-146. **Griffin, F. J.**—The relationship existing between entomology and bibliography. [Verh. VII Internat. Kongr. Ent.] 1: 548-552. **Haskins, C. P.**—Of ants and men. Prentice-Hall Inc. New

York: 1939. 244pp., ill. **Heikertinger, F.**—Uber den heutigen Stand des Nomenklaturproblems: Die Alltagsformel als Losung. [Verh. VII Internat. Kongr. Ent.] 1: 553-563. **Hemming, F.**—Notice of possible suspension of the Rules of Nomenclature in certain cases. [71] 41: 304. **Horn, W.**—Lehrt die Bioliographie, dass der systematischen entomologie eine gefahr droht? [Verh. VII Internat. Kongr. Ent.] 1: 567-578. **Horn, Walther.**—Obituary by H. Sachtleben (Dr. W. Horn zum Gedächtniss) [with portrait and bibliography]. [109] 6: 201-222, ill. **Jordan, K.**—Uber zwei die Entomologie betreffende Nomenklaturfragen. [Verh. VII Internat. Kongr. Ent.] 1: 583-587. Die Terminologie der Formen und aberranten Individuen innerhalb der Spezies und Subspezies. [Verh. VII Internat. Kongr. Ent.] 1: 579-582. **Liu, Gaines.**—The earliest Bureau of Entomology. [6] 47: 307-310. **Malaise, R.**—Fabricius und die erste Feststellung von Gattungstypen. [Verh. VII Internat. Kongr. Ent.] 1: 588-590. **Martin, C. H.**—Description of an insect container for a traplight. [19] 34: 255-257, ill. **Netolitzky, F.**—Abfassung, Sammlung und Katalogisierung der Verbreitungskarten zur Insektengeographie. [Verh. VII Internat. Kongr. Ent.] 1: 329-331. **P. B. M. A.**—The New Entomology. [9] 72: 234-236. **Rosenbaum, W.**—Antrage fur die Nomenklatur-Sektion des VII. Internationalen Kongresses fur Entomologie in Berlin, 1938. [Verh. VII Internat. Kongr. Ent.] 1: 591-598. **Spacek, C.**—Le grattoir-ecorcoir de M. Felton [Ent. Nachricht.] 12: 159-160, ill. **Stegeman, L. C.**—Some parasites and pathological conditions of the skunk [Mephitis mephitis nigra) in Central New York. [Jour. Mammology] 20: 495. **Strong, L. A.**—Records on the occurrence and distribution of insects. [Ward's Ent. & Nat. Sci. Bull.] 13: 1pp. **Weiss, H. B.**—An early entomological book for children. [6] 47: 303-306. Mantis and mouse. [6] 47: 314. Thomas Boreman again. [6] 47: 351-352. **Zarapkin, S. R.**—Das Divergenzprinzip in der Bestimmung kleiner systematischer Kategorien. [Verh. VII Internat. Kongr. Ent.] 1: 494-518.

ANATOMY, PHYSIOLOGY, ETC.—Byrk, F.—Lepidopteren-Anomalien, Prof. A. Tullgren in Freundschaft gewidmet aur seinem 65 ten Geburtstag. [28] 60: 259-273. **Evans, A. C.**—The utilization of food by certain lepidopterous larvae. [36] 89: 13-22. **Ferris & Pennebaker.**—The morphology of Agulla adnixa (Raphid.) [Microent.] 4:

121-142, ill. **Gilbert, H. A.**—Explorations of the hypopharynx in Noctuid larvae. [4] 71: 231-237, ill. **Hase, A**—Ueber die wirtswahl bei insekten. [Die Naturwissensch.] 27: 662-664. **Janse, A. J. T.**—On the structure of lepidopterous larvae, with special reference to the mature larva of Leto venus. [Journ. Ent. Soc. So. Afr.] 2: 165-175, ill. **Nolte, D. J.**—A comparative study of 7 spp. of Transvaal Acrididae with special reference to the chromosome complex. [Journ. Ent. Soc. So. Afr.] 2: 196-260, ill. **Kellogg, Robinson, Moss, & Blackmer.**—Variations in the size of wings of some Massachusetts honeybees. [12] 32: 665-666. **Lund and Bushnell.**—The relation of nutritional levels to the growth of populations of Tribolium confusum. II.—Egg production in patent flour and in patent flour supplemented by yeast. [12] 32: 640-642. **Melampy & McGregor.**—Nutritional value of certain foods for the adult honeybee. [12] 32: 721-725. **Pennebaker**—(see Ferris & Pennebaker). **Ranzi, S.**—Die wirkung der bauchganglienkette auf die Ausfärbung der imaginalaugen von Ephestia kühniella. [Die Naturwiss.] 27: 660-661, ill. **Sellke, K.**—Versuche mit chemischen zur Bekampfung des Kartoffelkafers (Leptinotarsa decemlineata). [110] 6: 146-171, ill. **Spieth & Ide.**—Some gynandromorphs of Ephemeroptera. [4] 71: 165-168, ill. **Stanley, J.**—A peculiar phenomenon observed in larval populations of the flour beetle Tribolium confusum. [31] 144: 753-754. **Steinberg, D.**—The regulatory processes in insect metamorphosis. II. The embryonic territories of wing and legs in the hypoderm of the caterpillars of Galleria melonella. [Biol. Jour.] 7: 993-1012, ill. [Russian with English summary]. **Sweetman, H. L.**—Responses of the silverfish, Lepisma saccharina, to its physical environment. [12] 32: 698-700. **Trukhanov, I. F.**—Phenomenon of wing reduction in some Hemiptera. [Comptes Rend. Acad. Sci. URSS] 23: 982-984, ill. **Tulloch, G. S.**—Variation in the head hairs of Culex apicalis larvae. [19] 34: 235. **Verrier, M. L.**—Sur le polymorphisme des ommatidies des yeux composes. [25] 44: 187-190, ill. Remarque sur les yeux de Gyrinus urinator. [25] 44: 62-64, ill. **Voukassovitch, P.**—Contribution à l'étude de la fonction des ovaires chez un Coléoptere: Phytodecta fornicata. [Bull. Acad. Sci. Math. & Nat. Belgrade] B. Sci. Nat. No. 5: 113-125, ill. **Warnecke, G.**—See under Lepidoptera. **Wigglesworth, V. B.**—Source of the moulting hormone in Rhodnius. [31] 144: 753.

ARACHNIDA AND MYRIPODA.—Chamberlin & Ivie.—Studies on North American spiders of the fam. Micryphantidae. [Verh. VII Internat. Kongr. Ent.] 1: 56-73, ill. (*). **Hoffmann, C. C.**—Nuevas consideraciones acerca de los Alacranes de Mexico. [Verh. VII Internat. Kongr. Ent.] 1: 191-210, ill. **Medcof, J. C.**—On the occurrence of the terrestrial Isopod Androniscus dentiger, in Canada. [Can. Field-Nat.] 53: 115. **Oughton, J. G.**—The burrow of an Arctic spider, Lycosa asivak. [Can. Field-Nat.] 53: 123-124.

THE SMALLER ORDERS OF INSECTS.—Castle, G. B.—The Plecoptera of western Montana. [4] 71: 208-211, ill. **Clay, T.**—A note on some Mallophagan names. [71] 41: 175-177. **Ferris & Pennebaker.**—(see under Anatomy). **Fox, I.**—New species and records of Siphonaptera from Mexico. [Iowa State Coll. Jour. Sci.] 13: 335-339, ill. **Gurney, A. B.**—Nomenclatorial notes on Corrodentia, with descriptions of two new species of Archipsocus. [91] 29: 501-515, ill. (*). **Hemming, F.**—(see under General). **Hungerford, H. B.**—A note on Mantispidae. [19] 34: 265. **Jordan, K.**—On five new Siphonaptera from the Republic of Argentina. [71] 41: 292-303, ill. (*). **Keler, S.**—Uber brasilianische Mallophagen. [109] 6: 222-253, ill. (*). **Mosley, M. E.**—The Brazilian Hydroptilidae. [71] 41: 217-239, ill. (*). **St. Quentin, D.**—Die systematische Stellung der Unterfam. der Corduliinae (Odonata). [Verh. VII Internat. Kongr. Ent.] 1: 345-360, ill.

ORTHOPTERA.—Beier, M.—Die geographische Verbreitung der Mantodeen. [Verh. VII Internat. Kongr. Ent.] 1: 5-15. **Chopard, L.**—See under General. **Cousin, G.**—Sur la variabilite des caracteres taxonomiques interspecifiques due a l'allometrie de taille. Varabilite du pronotum chez deux especes de Gryllides: Gryllus campestris et G. bimaculatus et leurs hybrides reciproques. [25] 44: 138-144, ill. **Mello-Leitao, C. de.**—Notes sur les Proscopides [Verh. VII Internat. Kongr. Ent.] 1: 292-302, (Sk*). **Rehn, J. W. H.**—Notes on the Orthoptera of Nova Scotia and Newfoundland. [4] 71: 175-178. **Rehn & Rehn.**—A review of the New World Eumastacinae (Acrididae). Part 1. [Pro. Acad. Nat. Sci. Phila.] 91: 165-206, ill. (*). **Strohecker, H. F.**—Distributional and taxonomic notes on southeastern Dermaptera and Orthoptera, and a n. sp. of Cycloptilum. [4] 71: 169-175, ill.

HEMIPTERA.—Barber, H. G.—A new bat bug from the eastern United States (Cimicid.). [10] 41: 243-246, ill. **Caldwell, J. S.**—New Psyllids from Alberta. [4] 71: 211-212, ill. **Davis, W. T.**—New cicadas from North America and the West Indies. [6] 47: 287-302, ill. **Ruckes, H.**—Brochymena florida, a n. sp. of Pentatomid from Florida. [19] 34: 236-239, ill. **Smith & Knowlton.**—Three intermontain Aphids. [4] 71: 241-243, ill. (*). **Strickland, E. H.**—Further notes on Psyllidae taken in Alberta. [4] 71: 212-215. **Trukhanov, I. F.**—(see under Anatomy). **Vayssiere, P.**—Un nouveau genre de Cochenille a Panama. [25] 44: 124-127, ill. **Williams, C. B.**—A tent-building whitefly (Aleurodidae) from Trinidad. [9] 72: 225-227, ill.

LEPIDOPTERA.—d'Almeida, R. F.—Revisao das especies americanas da superfamilia Danaoidea (Pierid.). [111] 34: 113pp., ill. (k). **Breyer, A.**—Uber die Argentinischen Pieriden. [Verh. VII Internat. Kongr. Ent.] 1: 26-55, ill. **Bryk, F.**—See under Anatomy. **Freeman, T. N.**—Notes on the distribution of Plebeius aquilo with the description of a new race from Manitoba (Lycaen.). [4] 71: 178-180, ill. **Hemming, F.**—(see under General). **McDunnough, J.**—An apparently new Epipaschid from Nova Scotia. [4] 71: 221-222. A new race of Papilio belonging to the machaon complex. [4] 71: 216-217, ill. **O'Byrne, H. I.**—Notes on butterfly migration, II. [19] 34: 252-254. **Schade, F.**—Eine neue Colla. [17] 56: 65-67, ill. (S*). **Williams, C. B.**—The migration of the Cabbage White Butterfly (Pieris brassicae). [Verh. VII Internat. Kongr. Ent.] 1: 482-493, ill.

DIPTERA.—Ahlberg, O.—Diarthronomyia chrysanthemi n. n. (= hypogaea Felt nec Loew), (Cecidomyid.). [28] 60: 274-278. **Alexander, C. P.**—New or little-known species of West Indian Tipulidae IV. [Jour. Agric. Univ. Puerto Rico] 23: 91-130, ill. **Hall, D. G.**—Two n. spp. of Tachinidae parasitic upon hemlock sawfly larvae in North America. [10] 41: 239-243. **Hering, E. M.**—Neue Trypetiden der Erde. [Verh. VII Internat. Kongr. Ent.] 1: 165-190, ill. (S*). **Jobling, B.**—A redescription of Pseudostrebla ribeiroi and the description of a n. gen. and sp. of the Streblidae from Brazil. [109] 6: 268-275, ill. (k). **Pechuman, L. L.**—Notes on some Mexican spp. of Chrysops (Tabanidae), and the description of a n. sp. [19] 34: 240-244. **Tuomikoski, R.**—Empidideistä ja niiden elintavoista. [Luonnon Ystava] 43: 48-61, ill.

COLEOPTERA.—Blake, D. H.—Eight new Chrysomelidae from the Dominican Republic. [10] 41: 231-239, ill. **Bruch, C.**—Un nuevo histérido Mirmecófilo. [Notas del Museo, Buenos Aires] 4: 259-262, ill. (s*). Misceláneas Entomológicas. [Notas del Museo, Buenos Aires] 4: 197-209, ill. (s*). **Falkenstrom, G.**—Beitrag zur Revision einiger Dytisciden-Gattungen, vor allem Deronectes und Oreodytes. [28] 60: 69-101, ill. (*). **Fiedler, C.**—Neue sudamerikanische arten der gattung Rhyssomatus (Curc. Chryptorhynch.). [Ent. Nachricht.] 12: 113-128, cont. (*). **Guignot, F.**—A propos du type genre Haliplus. [25]. 44: 176. **Hinton, H. E.**—On some new and little known South American Neoelmis (Elmidae). [8] 75: 228-235, ill. (Sk*). **Hopping, R.**—A n. sp. of Ips (Scolytid.). [4] 71: 168-169, (k). **Hustache, A.**—Descripción de una especie nueva del género Conotrachelus (Curculionid.). [Notas del Museo, Buenos Aires] 4: 323-328, ill. Un Curculionide hypoge du Chili. [25] 44: 46-48. Spedizione del Prof. N. Beccari nella Guiana Inglese (1931-32) Curculionidae. [Mem. Soc. Ent. Ital.] 17: 39-43, (*). **Kleine, R.**—Bestimmungstabelle der Brenthidae [Ent. Nachricht.] 12: 129-144. cont. (k). **Leech, H. B.**—On some Nearctic spp. of Agabus with the description of a n. sp. (Dytiscid.). [4] 71: 217-221, ill. **Mank, E. W.**—A review of the gen. Serropalpus (Melandryid.). [4] 71: 237-239, (k*). **Mank, E. W.**—Scotochroa and a closely allied n. gen., Scotochroides (Melandry.). [4] 71: 181-183, (k*). **Nunberg, M.**—Nuevas especies de Coleopteros del genero Platypus del Peru. [Bol. Mus. Hist. Nat. "Javier Prado"] 3: 51-60, ill. **Obenberger, J.**—Uber die von Herrn H. Schmidt in Costa Rica gesammelten Buprestiden. [109] 6: 301-314, ill, (*). Uber eine neue Buprestiden-Gattung und-Art aus dem Sammlungen des Deutschen Entomologischen Instituts nebst einigen Bemerkungen uber die Buprestiden-Tribus Schizopini [109] 6: 254-265, ill. (k*). **Paulian, R.**—Un nouveau Coleoptere Lamellicorne Coprophage d'Amerique du Sud. [25] 44: 20-21, ill. (k). **Schedl, K.**—Scolytidae y Platypodidae. [Notas del Museo, Buenos Aires] 4: 169-174, ill. (s*). **Tanner, V. M.**—Studies in the weevils of the western United States, No. III: New species from Utah. [Great Basin Nat.] I: 31-32. **Voss, E.**—Zur Einteilung der Platypodidae. [109] 6: 288-289, (k). Uber neue und wenig bekannte Russler-Arten aus der neotropischen Region, vorwiegend aus Brasilien. [109] 6: 335-340, ill. (*). **Vouk-**

assovitch, P.—See under Anatomy. **Wright, J. F.**—A new Loxandrus (Carabid.) from Cincinnati, O. [19] 34: 257-258.

HYMENOPTERA.—Banks, N.—Notes and descriptions of native Psammocharidae. [4] 71: 225-231, (k*). **Berry, P. A.**—Biology and habits of Ephialtes turionellae (Ichneum.), a pupal parasite of the european pine shoot moth. [12] 32: 717-721. **Bohart, R. M.**—A synopsis of the Odynerus boscii Group in North America (Vesp.). [19] 34: 245-251, (k*). **Burks, B. D.**—Two n. spp. of Platychalcis from Costa Rica. [109] 6: 275-278, ill. (Sk*). **Cockerell, T. D. A.**—Life and habits of bumblebees. [Sci Monthly] 1939: 554-557. **Giordani-Soika, A.** — Sur quelques genres de Vespides. [25] 44: 74-78. **Reid, J. A.**—On the relationship of the Hymenopterous gen. Olixon and its allies to the Pompilidae. [107] 8: 95-102, ill. **de Santis, L.**—Sobre dos nuevos Encirtidos hallados en la Republica Argentina con descripcion de un nuevo genero (Chalcidoid.). [Notas del Museo, Buenos Aires] 4: 329-338, ill. (*).

SPECIAL NOTICES.—The Insect Legion by M. Burr, xvi + 321 pp., ill. Jas. Nisbet & Co., Ltd., London. **VII. Internationaler Kongress fur Entomologie, Berlin, 1938:** Verhandlungen, Bd. I: 1-617 (Systematik un Tiergeographie; Nomenklatur und Bibliographie). **Introductory Note** on publication of new journal, The Great Basin Naturalist. By V. M. Tanner. Volume 1, p. 1. **A laboratory guide in entomology: For introductory courses by R. Matheson**—135 pp., ill., (k). Comstock Publ. Co., Ithaca, N. Y.

A New Entomological Serial.—We are glad to welcome into the fold of entomological publications a new serial: Memoirs of The Entomological Society of Washington. Number one has just appeared containing a contribution entitled, "The North American Bees of the Genus Osmia (Hymenoptera: Apoidea)." By Grace H. Sandhouse. 167 pp., 278 figures on eleven text plates. Although imprinted as being issued August 15, 1939, it was received by the American Entomological Society October 13, 1939, so there should be some published announcement stating how that date of issue was established.

THE NORTH AMERICAN BEES OF THE GENUS OSMIA. By GRACE SANDHOUSE. Memoirs just cited. Received October 9, 1939.—This work of 167 pages is the first of a proposed series of Memoirs to be published by the Entomological Society of Washington. When Miss Sandhouse left Colorado, many years ago, she had advanced far in the preparation of a revision of North American *Osmia*, and in 1924 and 1925 she published important papers on the species of California and Canada. The complete revision was long postponed and I had given up all hope of seeing it in print; but here it is at last, and it may be said at once that it will be the foundation for all subsequent work on the subject. I have made no attempt to check the findings in detail, but all things considered, my impressions are very favorable and I rejoice that such a useful paper is now available for students. There are 19 new species, but many previously described ones are treated as synonyms. Thus of 23 species previously described by Miss Sandhouse herself, no less than 11 are reduced to the synonymy. Much of the synonymy results from the association of the sexes which had been described under different names; but much also from unwillingness to recognize local races or subspecies. It is proper to say that the recognition of such races, just as in *Megachile*, is not always easy, and often must depend on the examination of more and better material than is now available. This being understood, the proposed synonymy does no harm, but is indeed valuable as associating insects which are very closely allied. It would have been well to have cited the type localities, not only of the recognized names but also of those placed in the synonymy. The obligation to keep the work down to a moderate size is no doubt responsible for the many new distribution records which appear under the names of the states only, with no other information of any kind. Perhaps at some future time a paper may be prepared giving the exact particulars. — T. D. A. COCKERELL.

MEADOW AND PASTURE INSECTS, by HERBERT OSBORN, assisted by MRS. DOROTHY J. KNULL. The Educators' Press Columbus, Ohio. 1939. Pp. viii, 288, 103 figs. $3.75.— Foreword by L. O. Howard, p. iii. In Chapter I, Meadow and Pasture Insects, pp. 1-11, the author's viewpoint is stated as follows: the meadows and pastures present a very distinct combination or a complex of organisms living in a close association, many of them with distinct mutual interdependence so that any attempt at a careful study of these conditions and the

economic problems concerned must involve a careful survey of the whole combination and an attempt to analyze the dfferent factors concerned. The immense place of grass and other forage crops in our system of agriculture is possibly hardly realized because the more tangible results and available figures appear in other products. After a brief historical sketch of earlier treatments of insects injurious to meadows and pastures, pp. 8-10, the conviction is emphasized that any adequate control of meadow pests, especially for permanent meadows or pastures, must be based upon a careful examination of the combination or aggregation of organisms in this complex rather than by efforts to find remedies for single species of pests. It is only in an occasional year that any one species of insect appears in a noticeably destructive outbreak but in practically every season the aggregate loss from the combined attacks of the many species of grasshoppers, the various cut worms and army worms, white grubs, wireworms, leafhoppers, etc., is a very heavy one on the meadow or pasture crop. It becomes especially desirable therefore to know the habits and the possibilities of prevention or control of the composite or average annual assemblage, even if in the course of time we do accomlish the enormous task of working out the biology of the thousand or more species that enter into the insect part of the meadow complex. In Chapter II, Ecology of the Meadow, pp. 12-42, ecologic factors are classed as physical (elevation, topography, slope, humidity, temperature, shade, exposure to sun and wind, evaporation and drainage and the geological, chemical and physical characteristics of the soil) and biological (interaction of all organisms permanently or temporarily in the area). The following topics are then discussed: local habitats, p. 15, local migration, pp. 16-17, climatic zones, pp. 18-19, soil relations, pp. 19-20, plant life, pp. 20-21, and animal life, pp. 24-29, of the meadow, the meadow as a source of insects for other crops, pp. 29-30, subterranean association, pp. 30-33, turf-inhabiting fauna, p. 33, the terrestrial association, pp. 33-34, the fence row community, p. 34, stability, p. 35, and sedentary nature, p. 36, of the meadow forms, their succession and interrelationship, p. 37, the geographical sources of meadow insects, pp. 37-39, geological origin of the meadow fauna, p. 39, and the meadow complex, illustrated by a diagram, pp. 40-42. Chapter III, pp. 43-55, considers the animal groups, other than insects, in the meadow fauna from mammals to protozoa. Chapter IV, the Insect Population, pp. 56-59, is concerned only with the nature of losses from insects. Chap-

ter V, pp. 60-69, states the general control measures for meadow and pasture insects in (*a*) fields which enter into a crop rotation and (*b*) in permanent pastures and meadows. The following chapters deal each with an order of meadow insects: VI Orthoptera (approximately 48 species), VII Thysanoptera (22), VIII Homoptera (119), IX Heteroptera (28), X Coleoptera (69), XI Lepidoptera (49), XII Diptera (17) and XIII Hymenoptera (45). These numbers do not include the species listed, with months of occurrence, at the conclusions of Chapters VI, IX, X, XII and XIII, based on collections made by A. E. Miller in the Ohio State University Meadow, which constitute a valuable contribution to knowledge of the insects of central Ohio. A list of the principal articles consulted in the preparation of the volume occupies pp. 273-283, the index pp. 285-288. It will be seen, therefore, that this book, in arrangement of contents and point of view, is a novelty in our American entomological literature and forms a worthy crown to Prof. Osborn's work in this field.—P. P. CALVERT.

A New Entomological Journal

Sweets & Zeitlinger, Ltd., Publishers and Booksellers, 471 Keizersgracht, Amsterdam, Holland, announce that they have recently published the Journal of the Entomological Society of South Africa, Volume I, March 31, 1939, 165 pages. With 18 figures, 6 plates and 2 portraits in the text, £ 1.2.6.

The first volume of this new journal publishes papers by members of the staff of the University of Pretoria, of Rhodes University College of the South African Institute for Medical Research at Johannesburg and others. Besides articles on South African insects, it contains those by Immelman, M.N.S., Pretoria — on the control of temperature and humidity of air in small cabinets; Omer-Cooper, Joseph, Rhodes University College—the classification of the recent hexapod insects, and obituaries of G. A. H. Bedford and Edward Meyrick.

South Africa offers a vast field for entomological research; the reports published in this journal will be of importance to entomologists the world over. The journal is obtainable from booksellers or from the publishers.

Entomological News for December, 1939, was mailed at the Philadelphia Post office on December 20th, 1939.

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This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

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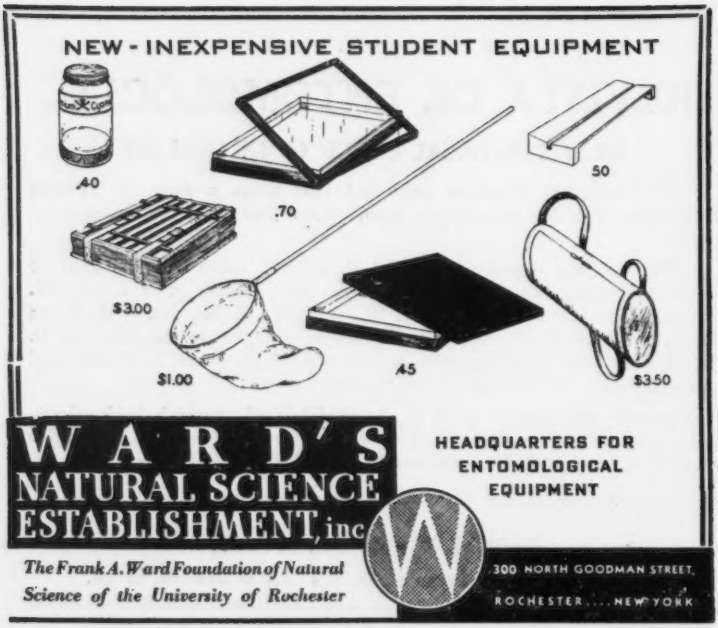

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